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Minorities and the culture of science and technology. A case study of Birmingham Dissenters 1760-1820

Minorités et culture scientifique et technique : le cas des non-conformistes de Birmingham, 1760-1820

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Minorities and the culture of science and technology. A case study of Birmingham Dissenters 1760-1820

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Abstract

This paper explores the link between minority religious groups and technological or inventive activity in eighteenth-century England. It goes without saying that social scientists and historians have long considered religion and worldly behaviour to constitute an important site of interaction. The supposed link between "dissenting" religion (Calvinism) and entrepreneurship, in particular, has received sustained scrutiny. It remains exceedingly difficult to demonstrate a general causal relationship in this area, however. Indeed, modern cultural interpreters of the history of science and technology tend to question the existence of any such relationship. The paper is based on a case study of scientific and entrepreneurial activity in Birmingham and the West Midlands during the period circa 1760-1820. This research is ongoing.

Résumés et mots clés en français sont regroupés en fin de volume, accompagnés des mots clés anglais.

I bless God that I was born a Dissenter,
not manacled by the chains
of so debasing a system
as that of the Church of England and that
I was not educated at Oxford or Cambridge.

(Dr Joseph Priestley, 1792)

This paper sets out to explore the link between minority religious groups and technological or inventive activity in eighteenth-century England. It goes without saying that social scientists and historians have long considered religion and worldly behaviour to constitute an important site of interaction. The supposed link between 'dissenting' religion (Calvinism) and entrepreneurship, in particular, has received sustained scrutiny. Yet it remains exceedingly difficult to demonstrate a general causal relationship in this area. Indeed, modern cultural interpreters of the history of science and technology tend to question the existence of any such relationship.[1] My paper will offer suggestions rather than firm conclusions therefore. It is based on a case study of scientific and entrepreneurial activity in Birmingham and the West Midlands district in the period 1760 to 1820. Although my research is not yet complete and the study can make only preliminary comments on the interface between science and religion, the evidence gathered to date does not provide much support for the proposition that adherence to Nonconformity nurtured the 'spirit of capitalism' in a way that adherence to the Established Church did not.

Dissenters in Birmingham and the West Midlands

Unlike the continental states of Europe, England in the eighteenth-century was a society characterised by the more or less open acceptance of religious pluralism. There *was* a state church (the Church of England), however, and the majority of the population *did* adhere to it. Since Henry VIII's break with Rome

1 See Wood P. ed., *Science and Dissent in England, 1688-1945*, Aldershot, Ashgate, 2004; Cantor G., *Quakers, Jews and science: religious responses to modernity and the sciences in Britain, 1650-1900*, Oxford, Oxford University Press, 2005.

in the middle of the sixteenth century, it had been a Reformed or Protestant church. Yet there also existed numerous religious minorities: Catholics, Jews and Nonconformists of various descriptions. Nonconformists were Protestants who rejected the doctrines of the Church of England, and in the eighteenth century they were more commonly referred to as Dissenters. Adherents of the Established Church, by contrast, were known as Churchmen (nowadays we would call them Anglicans). It is important to bear in mind that the collective noun "Dissenters" was applied solely to Protestant Nonconformists, not to Jews or to Catholics who also formed religious minorities in this period. However, the Dissenters were not internally united, a fact that is all too frequently overlooked. Whilst it is true that they all objected in varying degrees to the "state" or "established" Church, they often disagreed fundamentally and acrimoniously among themselves on matters of theology and church governance.

For the purposes of this paper the Nonconformist sects of chief interest are the Presbyterians, the Quakers, the Independents, and the Baptists. Most Presbyterians were Calvinist in matters of doctrine, although by the century's end the Unitarians would form a distinct sub-group within a fragmenting Presbyterian community. The Quakers tended to emphasise the authority of the Holy Spirit rather than that of the Bible, while the Independents would progressively transform themselves into Congregationalists. Together with the Baptists, they were the fastest growing of the Nonconformist sects.

Each and every one of these groups constituted a religious minority in the context of the Hanoverian state. They all, moreover, suffered civil and political disabilities, and the older communities (Presbyterians and Quakers) looked back on a history of state-sponsored persecution in common with Jews and Catholics. Unitarians, indeed, were forced to worship outside even the limited protection afforded by the 1689 Toleration Act. As deniers of the Trinity, they remained vulnerable to formal and informal persecution for much of the eighteenth century. Nonconformity may have ceased to be a "crime" *stricto sensu* in 1767, but the cultural reflexes of the persecuted lingered on among these sects. Not until 1828 (1829 for Catholics; 1858 for Jews) would all traces of the punitive seventeenth-century legislation against those unwilling to subscribe to the Thirty-Nine Articles of the Church of England be removed from the statute book.

A possible reason why Birmingham became a magnet for the Presbyterians of the district is that it did not have a charter and was therefore exempt from the scope of the 1665 Five-Mile Act. Not until 1838 would the town secure incorporation. But this is not to say very much: most provincial English towns contained minority communities of Dissenters, whether or not they were chartered. Memories of persecution may have persisted, but they will not provide an explanation on their own of the behaviour of Nonconformists in the latter half of the eighteenth century. Even though the law of the land continued to debar Dissenters from holding public office, ways could usually be found to circumnavigate this disability. By the second half of the eighteenth century Dissenters were scarcely being thrust into mercantile and industrial occupations because other avenues of social promotion had been closed to them – tempting though this hypothesis may seem. By and large their vocations were a matter of unfettered choice.

How many Dissenters were there in Birmingham? This is not an easy question to answer since civil census data will not take us back beyond 1801, and the first nation-wide census of religious affiliations was not conducted until 1851. But working backwards from this reasonably solid ground, it is apparent that by the middle of the nineteenth century roughly a quarter (24%) of Birmingham's overall population (271,674) was routinely attending a religious service of some description. Roughly half of these individuals went to "church" (i.e. an Anglican establishment), and half went to "chapel" (i.e. a Nonconformist place of worship).[2] However, these figures can easily mislead. What they chiefly disclose is the explosive growth in the early nineteenth-century of what is sometimes described as "New Dissent"; that is to say the Baptists and Congregationalists, and above all the Methodists who would cut their ties with the established Church following the death of John Wesley in 1791.

During the second half of the eighteenth century – the crucial period of Birmingham's scientific and technological dominance – the Dissenter community was quite small. It was smaller than contemporaries imagined at the time, and smaller than historians have supposed subsequently. If we lump all the sects together and then allow a fairly large margin for error (missing sources, under recordings etc.), we arrive at the following approximations:

2 Briggs J. H. Y., "Elite and Proletariat in Nineteenth-Century Birmingham Nonconformity", in Sell A. P. F. ed., *Protestant Non-conformists and the West Midlands*, Keele, Keele University Press, 1996, p. 81.

Estimated Nonconformist population of Birmingham[3]

(as a percentage of total households)

1751-1760	1771-1780	1791-1800	1811-1820
14.9%	11.6%	6.1%	7.3%

Although their effectives were increasing in numerical terms, it can be seen that the Dissenters formed only a small segment of Birmingham's rapidly expanding population. But maybe this is to miss the point. Whilst the quantitative data convey an impression of relative insignificance, there is considerable qualitative evidence to indicate that the non-Anglicans constituted a very high-status community. It is an exaggeration, but only a slight exaggeration, to state that in the 1770s and 1780s the majority of the town's most affluent citizens and most of its largest employers of labour were Nonconformists. Ranked by wealth, the Quakers and the Unitarians ruled the roost, and they were able to do so owing to the numerical weakness and cultural immaturity of the genteel classes. Eighteenth-century Birmingham, it should be remembered, was an industrial "new town", not an established county seat or an ecclesiastical centre.

A Protestant ethic ?

In a long essay first published at the start of the twentieth century Max Weber argued that the theology of early seventeenth-century Calvinistic Protestantism generated a particular outlook in the minds of believers which proved extraordinarily conducive to capitalist economic endeavour.[4] The principal denominators of this ascetic mentality according to Weber were diligence in the pursuit of one's calling, the efficient and constructive use of time, and self-restraint in the immediate satisfaction of material needs. Thus equipped, it was not difficult to comprehend why some Protestants should have become capitalist entrepreneurs, he submitted. Although the proposition that Protestantism thereby caused capitalism does not belong to Weber, many critics have retorted by pointing to examples of manifestly capitalist behaviour that antedated the Reformation, whilst others argued that he misconstrued the thrust of Calvin's theology. Of greater relevance for this paper, however, is R. H. Tawney's[5] reaction. He did not dispute a link between capitalism and the more rationalistic formulations of post-Reformation religious belief, but hypothesised a reversal of the causal sequence. Perhaps the newly-minted Protestants took over the ethics of the capitalists rather than *vice versa*. On the subject of activity in the sciences Weber had little to say, although it is clear that he viewed the spirit of capitalism as also facilitating the expansion of experimental natural philosophy and the accumulation of technologically useful knowledge.

The debt which the American social scientist Robert Merton[6] owed to Weber's *The Protestant ethic* is unmistakeable. Indeed, it is likely that his doctoral dissertation, which appeared in 1938 in the shape of a monograph entitled *Science, technology and society in seventeenth-century England*, was directly inspired by Weber's essay. Merton focused his attention on the English Puritans of the second half of the seventeenth century rather than the salvation-imperilled faithful of the continental reformers during the first half, and he set out an argument for regarding Puritanism as one of the principal vectors of the rise of experimental natural philosophy in Restoration England. Weber had noted in passing the probability of a causal connection between the efflorescence of science and the Puritan version of Protestant Christianity, but had not fleshed out the link in a systematic fashion. Unlike Weber, however, Merton placed less emphasis on properly religious motivation – that is to say on the individual's preoccupation with salvation as the driver of behaviour – and rather more on

3 See Archives of the Birmingham [Quaker] Meeting; Bushrod E., "The History of Unitarianism in Birmingham from the Middle of the Eighteenth Century to 1893", Birmingham, University of Birmingham MA thesis, 1954; Money J., "Science, technology and Dissent in English provincial culture: from Newtonian transformation to agnostic incarnation', in Wood P.,*op. cit.*; Ram R. W., "Influences on patterns of belief and social action among Birmingham Dissenters between 1750 and 1870", in Bryman A. ed., *Religion in the Birmingham area: essays in the sociology of religion*, Birmingham, University of Birmingham Occasional Papers, 1975, pp. 29-44; *A history of the county of Warwick*, volume VII: *The city of Birmingham*, Oxford, Oxford University Press, 1964; Chalklin C. W., *The provincial towns of Georgian England: a study of the building process, 1740-1820*, London, Arnold, 1974; Pratt D. H., *English Quakers and the first industrial revolution*, New York, Garland, 1985.

4 Weber M., *The Protestant ethic and the spirit of capitalism*, translated by T. Parsons, London, Allen & Unwin, 1930.

5 Tawney R. H., *Religion and the rise of capitalism: a historical study,* Holland memorial lectures, 1922, London, Murray, 1926, pp. 113, 212 and note 32.

6 See Merton R. K., *Science, technology and society in seventeenth-century England* (originally published in *Osiris*, 4, 1938, pp. 360-632), New York, Harper, 1970.

a wider set of beliefs and cultural reflexes that could be taken as the hallmarks of the Puritan way of living. Yet he took care to qualify his argument, stressing that he was not positing an association of experimental science with Puritanism to the exclusion of other explanatory factors. Indeed, he explicitly acknowledged that such factors could override the socio-religious on occasion. He also allowed that the impact of Puritanism on science might occur at one remove – as the "largely unwitting"[7] knock-on effect of Puritan cultural values.

This last refinement makes room for the long-term and quite possibly unintended consequences of Puritan asceticism. Some might argue that it stretches the explanatory capacity of his argument to breaking point. If distant correlations are to be substituted for tightly causal sequences, it becomes rather difficult to see how Merton's hypothesis can be put to the test. But the argument has attracted plenty of critics who express reservations, or objections, on more empirical grounds which are not relevant to our enquiry. Whether it is the theology or the spirit of the Puritan version of Protestantism which is the point at issue, there is a dearth of direct, motivational evidence which might enable us to understand the process by which religious Nonconformists were turned into early-modern capitalists, or budding scientists. All we have are a handful of micro-studies from which it would be hazardous to generalise.[8]

If we return to Birmingham, the origins of its eighteenth-century Dissenter community lay indisputably among the Puritan sects of the middle decades of the seventeenth century, and several authors have suggested that the town's entrepreneurial flair and technological prowess may be attributed to their presence. Robert Schofield,[9] the historian of the Lunar Society, offers an interpretation along these lines – in keeping with a historiographical tradition that depicts the flowering of provincial science as pre-eminently the achievement of marginal social and religious groups. More recently Eric Hopkins has speculated that Birmingham owed its success to its position at the hub of a Nonconformist network.[10] It is true that the Dissenters played a role in the commerce and industry of the town that was out of all proportion to their numbers, and that some of the most talented figures in the Lunar circle were no friends of the Established Church (Joseph Priestley, James Watt, Erasmus Darwin, Samuel Galton junior, Josiah Wedgwood etc). On the other hand Matthew Boulton, proprietor of the Soho Manufactory and the town's biggest employer who had a host of technological improvements to his name, James Keir, industrial chemist and inventor, and Dr William Withering, mineralogist, botanist and pioneering physician, were all Churchmen.

Nonetheless, there clearly existed a contemporary belief – if only among foreign visitors – that Protestant Dissenters tended principally to be found in business and tended to conduct their affairs on a different moral plane from that of ordinary mortals. Barthélemy Faujas de Saint-Fond who visited Birmingham in 1784 on the way back from Scotland insisted that "all Quakers are merchants."[11] However, the Quaker who seems to have impressed him the most was John Lettsom, the London-based physician and scientific experimenter. Horace-Bénédict de Saussure of Geneva, who was himself of French Huguenot stock, shared the fascination with this sect. "The Friends [i.e. Quakers]", he observed, following a visit to the West Midlands in 1768, "never charge more for their goods than they are worth." Yet he went on to note that the 'worldy asceticism' (to employ Weber's concept) of the Quakers was beginning to be challenged as England's commercial and consumerist Enlightenment took hold. "Many youthful Quakers whose fathers have died leaving them rich", he continued, "have a longing to wear buttons on their sleeves and live after the fashion of other young men".[12]

Religious precepts undoubtedly acted to constrain public and business behaviour in the minds of many members of the Dissenter community in Birmingham, as elsewhere. Although far removed from the Caribbean islands' plantation economies, Birmingham metal goods manufacturers could scarcely avoid the moral

7 See Bernard Cohen I. ed., *Puritanism and the rise of modern science: the Merton thesis*, New Brunswick, Rutgers University Press, 1990, p. 2 ; Wood P., *op. cit*., p. 1.

8 For the most recent, see Jacob M. C. and Kadane M., "Missing now found in the eighteenth century: Weber's Protestant capitalist", *American historical review*, 108, 2003, pp. 20-4.

9 Schofield R. E., *The Lunar Society of Birmingham: a social history of provincial science and industry in eighteenth-century England* , Oxford, Oxford University Press, 1963.

10 Hopkins E., *The first manufacturing town in the world, 1760-1840* , London, Weidenfeld & Nicholson, 1989, p. 83.

11 See Bayne-Powell R., *Travellers in eighteenth-century England*, London, Murray, 1951, p. 160.

12 *Ibid.* See also the journal of Jabez Maud Fisher who measured the businessmen whom he met on his English travels in accordance with a Quaker code of conduct in Morgan, K. ed., *An American Quaker in the British Isles: the travel journals of Jabez Maud Fisher, 1775-1779*, Oxford, Records of Social and Economic history, p. 25.

issues posed by slavery. Guns, chains and all the devices required to keep men in captivity were part of the town's stock-in-trade. Samuel Galton junior, a Quaker manufacturer, produced guns at his works in Steelhouse Lane in the centre of Birmingham. As public opinion became sensitised to the issue of black slavery in the later 1780s, he came under pressure from fellow Quakers to withdraw from the trade. In fact, he would eventually be excluded from the Meeting 'for being concerned in a manufactory of arms.'[13] By 1804 the family had completely wound up its gun business and moved to the morally safer territory of banking instead.

If we shift our gaze from individual Dissenter manufacturers to whole communities, it does seem possible to detect a specific role for religious minorities in the perfecting of technological processes and perhaps even in the circulation of "know how". Arthur Raistrick has pointed us to the massive presence of Quakers in the iron industry, [14] and James Walvin confirms this observation. [15] Members of the Society of Friends seem either to have owned or to have controlled between a half and three-quarters of the ironworks of England and Wales at the start of the eighteenth century. But we must be very careful how we construe this evidence, for as Michael Watts insists: "one does not need to invoke an elaborate theory of the connection between 'the Protestant ethic and the spirit of capitalism' to explain the evolution of Baptist tradesmen and Quaker ironmongers into Baptist merchants and Quaker ironmasters in a period when the country's trade was increasing and Parliament was removing monopolistic restrictions from commerce and industry."[16]

So what impelled Dissenters towards becoming so heavily involved in trade and industry, whether in Birmingham or in Bristol or Manchester ? The non-Weberian answer must be that towns do not make Dissenting industrialists; they suck them in from elsewhere and reward them with economic opportunities which then tend to act as solvents of sectarian religious conviction. This is the process that can be detected in Birmingham from the middle decades of the eighteenth century: a convergence in which wealthy and increasingly cultured Dissenters regrouped with wealthy and increasingly cultured Churchmen around the concept of "rational" religion. The alternative argument that Dissenters became successful manufacturers and businessmen because they were excluded from other avenues of social advancement and cultural assertion is less persuasive, for the reason that there is very little evidence that they were excluded from offices of trust in the town prior to the 1790s.

However, the Quakers may represent an exception. Notwithstanding the latitudinarian pressures of the English Enlightenment, they seem to have constituted something of a sub-culture within the ranks of Protestant Dissent. If only for organisational reasons, they did not participate as fully in the general regrouping of the town's socio-economic elite around a common set of spiritual and cultural values. Whilst it is not possible to demonstrate a causal link between their theology or religious practices and their migration towards the metallurgical industries, commerce and banking, it does appear that their moral outlook and the precepts of the Meetings informed the manner in which they conducted themselves as entrepreneurs. The injunction against marrying-out and the pervasive discipline of the Monthly Meeting certainly facilitated the creation of Quaker dynasties – particularly in those industries involving a large financial outlay with all its attendant risks. In a context of unlimited liability in business, the raising of capital amongst co-religionaries was often the safest option, and the Meetings provided a ready-made network for the purpose.

The well-known industrial partnership of Dr John Roebuck and Samuel Garbett will serve as a final comment on the problems inherent in focusing on a particular religious minority when trying to unravel the conundrums posed by the spirit of inventiveness and the circulation of technological knowledge. Born into a prosperous family that had made money in the Sheffield cutlery industry, Roebuck had the classic education of the upwardly-mobile Dissenter. Debarred from the ancient English universities, he took a medical degree at Edinburgh – soon to be hailed as Europe's premier science university – instead, and then proceeded to Leiden to complete his studies. While practising medicine in Birmingham, he met Garbett – a Churchman – and in 1746 they set up a metal refining laboratory in Steelhouse Lane. In the course of his professional duties, Roebuck had discovered an improved method of refining gold and silver. Like so many medically-trained men of his generation, he

13 *The Times,* 19 May 1797.

14 Raistrick A., *Quakers in science and industry being an account of Quaker contributions to science and industry during the 17th and 18th Centuries*, Newton Abbott, David & Charles, 1968.

15 Walvin, J., *The Quakers: money and morals*, London, Murray, 1997, p. 105.

16 Watts M. R., *The Dissenters*. Vol. 1: *From the Reformation to the French Revolution*, Oxford, Oxford University Press, 1978, p. 361.

would contribute more to the advancement of science and industry than he would ever contribute to the improvement of human health. Shortly afterwards he perfected the technology for the mass production of sulphuric acid (the lead-chamber process) for which he is justly famous, and the partners proceeded to open a vast new works for the production of acids at Prestonpans outside Edinburgh.

It is not clear whether any of this progress had been achieved with the aid of Nonconformist networking, or even whether the advances in acid production owed more to Roebuck's mastery of chemistry or Garbett's skills in metal technology. But the successful launch of the partners' next venture, the Carron ironworks (1759-60), certainly owed most to Garbett. It was Samuel Garbett – the life-long Anglican – who went over to Shropshire in order to gather "know how" from the Quaker ironmasters of Coalbrookdale about the use of coke for the smelting of ironstone. The element of local knowledge and personal reputation unsullied by sectarian differences seems therefore to have been the key to this collaboration between a Dissenter and a Churchman – a collaboration that would result in the successful introduction of coke-fired smelting to Scotland.

Conclusion

What do these anecdotes amount to? Very little on their own it must be acknowledged. If conclusive evidence exists to demonstrate that the "breakthrough" technologies of the second half of the eighteenth century were chiefly the work of religious minorities, I have yet to locate it. On a reading of the evidence relating to Birmingham and the West Midlands I am not persuaded that Protestant Dissenters – the subject of this paper – can be described in any deep-seated sense as marginal figures by the end of the century either. The Baconian spirit of scientific enquiry was not demarcated by religious affiliation, for science in England, as a generation of cultural historians have repeatedly told us, formed a part of polite culture.

However the Quakers are an interesting case, for something seems to have kept them apart. In Birmingham, at least, they continued to exhibit at intervals the reflexes of an introverted religious minority. To judge from Geoffrey Cantor's investigation of the community,[17] they were not alone in this hesitant embrace of modernity. Quakers in general were less receptive to mathematised Newtonian natural philosophy, he finds. If they made a characteristic contribution to natural knowledge, it lay more in the area of observational sciences such as botany. Nature study fitted in well with eighteenth-century Quakers' illuminist theology, and it helped, moreover, to inculcate practical skills of immediate utility to the wider community.

It is in this context that Samuel Galton junior's education, interests and attainments become relevant once again. He did not receive a "sectarian" education, for Quaker schools scarcely existed in the 1750s and 1760s. Instead he attended a number of Dissenting institutions, including the Academy at Warrington. Whilst there he probably benefited from a grounding in the sciences, but researchers now question whether Nonconformist establishments offered a curriculum which was very much different from their Anglican counterparts.[18] Evidence from later on in his life indicates that he was a proficient classical scholar as well as a fluent French speaker, which hints at home tuition as befitted the son of an affluent Quaker. A bent for the observational sciences – botany and ornithology – is well attested, too. Yet both his daughter and grand-daughter recalled that he was also a practised experimentalist with a strong interest in the exact sciences. Whether any of these predilections can be linked in a neatly causal fashion to his status as a Dissenter remains an open question, however. On balance, it seems more likely that Galton junior's scientific interests were nurtured in the free-thinking atmosphere of the Lunar Society, than in the setting of the Monthly Meeting.

Why have Dissenting minorities attracted so much attention? For several reasons, I think. A focus on the behaviour and actions of a religious minority seems to hold out the prospect of a general explanation for the disquieting randomness of natural knowledge accumulation and technological innovation. But this hypothesis – if it is to carry any force – requires investigators to dwell upon the social and political marginality of the Protestant Dissenter community, whether in Birmingham and the West Midlands or elsewhere. It cannot be described as entirely misplaced to be sure. However, the most recent studies seem to indicate that Max Weber and Robert Merton's views must remain speculative until detailed empirical support can be mustered.

17 Cantor G., *op. cit.* note 2.

18 Wood P., *op. cit.* note 2, p. 2.